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12 January 1986

Worldwide Report

ARMS CONTROL

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WORLDWIDE REPORT

ARMS CONTROL

Briefs

SDI AND SPACE ARMS

KRASNAYA ZVEZDA ON SDI, NEW U.S. JOINT SPACE COMMAND

Moscow KRASNAYA ZVEZDA in Russian 15 Oct 85 p 3

[Article by Capt 2nd Rank Ye. Nikitin: "Up the Steps of Madness"]

[Text] "Nuclear megadeath is nothing to the reactionary circles that dream in thousands of warheads, they are increasing their monstrous arsenal on Earth and threatening outer space, contemplating 'star wars,'" writes G. M. Grechko, a two-time Hero of the Soviet Union and a pilot and cosmonaut of the USSR, in an article that appeared in the recently published special edition of the magazine NOVOYE VREMYA. This edition was formulated as a supplement to the magazine titled "The Arms Race: Do not Permit it in Space and End it on Earth."

With extensive factual material, the authors show how the plans to militarize space were conceived and spread, how the increase of the Pentagon's nuclear potential in combination with the notorious "star wars" program threatens peace and convincingly exposes the adventurism of the current U.S. leaders, who have begun to dream of achieving military superiority over the Soviet Union by creating space weapons.

American imperialism is climbing the steps of madness toward the beginning of a principally new round of the arms race. Practically all systems of space weapons are presently at various stages of development and testing, including chemical lasers, elementary particle accelerators, X-ray lasers with a nuclear surge, electromagnetic cannons, satellites with small self-guided missiles...

The authors emphasize that an especial danger of the adventurist policy of the United States is that the arms race can develop into a qualitatively new phase--uncontrollable processes will begin in the area of armaments and the risk of nuclear war arising will increase sharply. Common sense suggests that the only way out of the situation that has been created is to freeze the nuclear arsenals of all sides, halt the preparations for creating new attack weapons for space placement and on that basis immediately go over to a decrease in the accumulated stockpiles of arms.

The practical affairs of Washington demonstrate that across the ocean they do not wish to heed the voice of reason. The recent militarist actions of the White House are a particular challenge. The United States conducted testing of the ASAT anti-satellite system against a real target in space. There

then followed testing of a land-based laser installation during which a laser beam was directed against a Terrier-Malamute missile and tracked it in flight. The conducting of underground nuclear weapons testing continues.

To coordinate efforts in militarizing space, on September 23 the United States began to operate the Joint Space Command of the U.S. Armed Forces with staff headquarters in Colorado Springs (the state of Colorado). As shown by the authors of the special supplement to NOVOYE VREMYA magazine, the initial program of operation of the Joint Space Command has already been formulated and intermediate targets and timetables have been projected.

Also revealing are the resources assigned to basic research and development in the 1984-87 fiscal years. Appropriations for the main types of activity within the "star wars" framework over this period will increase a hundredfold: from 50 million dollars in 1984 to 4.9082 billion in 1987.

The accumulation of ever newer and more destructive types of weapons both on Earth and in space only heightens international tension. As noted by M. S. Gorbachev at a meeting with French parliamentarians, the world situation is so tense "that it has now become extremely difficult to negotiate not only on the complicated issues that cannot be put aside, but on relatively simple problems. If we do not stop the current operative tendencies, we may not be able to overcome their monstrous inertia. Discussion will become more difficult."

The value of the supplement to NOVOYE VREMYA magazine is that light is thrown upon the most pressing problem of modern times from different angles. The material has a rich style, is filled with illustrations and is set forth in popular style.

12821

CSO: 1801/45

NORWEGIAN GOVERNMENT OPENS DISCUSSION OF SDI

Debate Splits Parliament

Oslo AFTENPOSTEN in Norwegian 3 Dec 85 p 5

[Article by Morten Malmo: "SDI Dispute Divides Storting"]

> [Text] The Labor Party and SV [Socialist-Left Party] have joined forces in opposing the government's stand on the American space research program, SDI. "It is impossible to distinguish between the civilian and the military aspects of SDI," Hanna Kvammo of SV told AFTENPOSTEN. "This is the biggest headache the government has," said Einar Forde (Labor) after Harald Synnes of the Christian People's Party told Storting yesterday that it is inappropriate for Norway to participate in any research program aimed at weapons development.

The controversy over SDI was a political highlight in the more than 6-hour debate Storting had yesterday on the 1986 budgets of the Industrial Affairs Ministry and the Oil and Energy Ministry. Industrial Affairs Minister Petter Thomassen said the government would not oppose Norwegian industry if it wanted to look into the possibilities of participating in the civilian aspects of the SDI program. The Conservative Party's industrial policy spokesman in Storting, Per-Kristian Foss, said it would put Norway even further behind in the technological race if Norwegian firms were summarily prevented from taking part in projects that involve American SDI funds.

The parliamentary leader of the Christian People's Party, Harald Synnes, said that it is inappropriate for Norway to take part in any research program aimed at weapons development. "It should also be obvious that a Norwegian participation that can be interpreted as a general acceptance of the Star Wars program is equally inappropriate," said Harald Synnes.

"These are clear reservations. They are so clear that it is easy to see that the distance between the government parties is greater than we had thought," the Labor Party's industrial policy spokesman, Einar Forde, said in a comment on Harald Synnes' remarks.

"And besides that the distinction between civilian and military aspects of SDI is fictitious," said Forde. The same point was made by SV parliamentary leader Hanna Kvanmo, who told AFTENPOSTEN that it is impossible to accept the SDI program in any case. She also pointed out that Storting must now be briefed on SDI's European alternative, Eureka, so that a stand can be taken on that project.

The Industrial Affairs Ministry's budget was increased by 47 million kroner yesterday in relation to the government's budget proposal and the government parties' budget compromise in Storting. This occurred when the Labor Party, SV and the Progressive Party voted for additional funds for the Norwegian Council for Scientific and Industrial Research, national development contracts and ore exploration efforts in North Norway. Following yesterday's vote the Industrial Affairs Ministry's budget will be around 2.5 billion kroner next year.

The Labor Party, SV and the Progressive Party also added 4 million kroner for the Oil Directorate and 3 million kroner for energy research. These two items came under the Oil and Energy Ministry's budget.

Industry Spokesman Advises Participation

Oslo AFTENPOSTEN in Norwegian 5 Dec 85 p 43

[Op Ed article by Arnulf Ingebrigtsen, Director of the Federation of Norwegian Industries: "Norwegian Industry Should Take Part in SDI Research"]

[Text] When Storting discussed the Industrial Affairs Ministry's budget this week, members also brought up Norwegian participation in the American SDI program. This issue, which had previously appeared to be largely a foreign policy concern, thus acquired clear industrial policy aspects as well.

Spokesmen for the government and the government parties kept the door open for Norwegian industrial participation in what is probably the biggest international high technology research program at this time. But unfortunately there were others who made vigorous attempts to close the door for Norwegian firms and research institutions.

Obviously the question will be debated in the future. Many important aspects can be clarified in the process. But on the basis of Monday's debate in Storting we must issue a strong warning against political parties in Storting becoming so enmeshed in a self-created problem that Norwegian industry and research will be unjustifiably isolated from what is going on. This could be serious. Other NATO countries are taking an active part.

The Labor Party's main industrial policy spokesman used two dubious arguments. First he gave the impression that Norwegian industry is not really interested in this research program and then he tried to stigmatize firms "that go in for this" as practically immoral and accused them of acting contrary to the position of the government and Storting.

Thus two points should be made clear before we continue the debate on this issue.

In the first place Norwegian industry is very interested in this research program. For example, just before the debate the Federation of Norwegian Industries sent a letter to the Storting Industrial Committee. It would be very valuable for Norwegian firms to be able to cooperate with American circles that are definitely ahead in two technological areas that have been designated as areas of emphasis for our own policy, namely information technology and materials technology. Most of the research going on under the umbrella of what the Americans call SDI will have civilian applications. A lot of civilian research in the United States will be channeled into this program.

This point illustrates another important aspect of the issue. We must not mix the ideas of military and civilian research together into a meaningless and unworkable problem of definition. Or should we react in the future to the slightest suspicion that one research result or another could be used in connection with a defense product?

In Norway we have traditionally objected to involvement in the production and especially the export of what are commonly called "weapons" or military materiel. But in everyday life we have accepted the fact that many industrial processes and products have practical applications for both civilian and military usage. For the most part this has involved traditional industrial activities. One of the reasons for this is that the high-tech element in our industry is not as strong as it is in many other countries. But the point of conducting research under the SDI umbrella is that it involves a more advanced industrial level, namely advanced technology. It would be unfortunate if we embrace at this particular stage an industrial policy of self-denial that prevents us from working to create an advanced industrial sector in this country.

Technological advances in such fields as electronics, materials technology and so forth can have important applications for both so-called civilian and military products. A number of technological solutions have been discovered in the civilian branch of industry that can also be used in the field of military defense.

And this goes both ways. Many research projects in the defense sector have had important civilian spinoff effects. This is true of such things as new computers, radar, communications systems, laser technology and improved metal and fiber materials.

Sweden is an example of a country with an advanced industry. In recent years there have been debates over purchasing highly developed products from Sweden ranging all the way from missiles and planes (based on a high level of expertise in such areas as electronics) to military cross-country vehicles and trucks. These come from companies that we admire for their industrial level--and that we would like to have in Norway.

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OVERVIEW OF PROJECTED FRENCH PARTICIPATION IN EUREKA

Paris EUREKA: LA RENAISSANCE TECHNOLOGIQUE DE L'EUROPE in French Jun 85

[Official document of the French Republic; typed version published by CESTA [Center for Studies on Advanced Systems and Technologies]; 77 pages, not numbered]

[Text] Paris, 27 June 1985

It is now two months since the EUREKA program was launched.

The first results are already considerable. Witness the agreements already signed in the fields of data processing and computer-integrated manufacturing or electronic components by the following manufacturers:

- MATRA [Mechanics, Aviation and Traction Company] and Norsk Data, on compact vector computers;

- Bull and Siemens, on large digital computers;

- GEC [General Electric Company], Philips, Siemens and Thomson, on advanced microprocessors, gallium arsenide integrated circuits, microwave components, high-density memories, flat-panel screens, and all kinds of sensors;

- Aerospatiale and MBB [Messerschmidt-Boelkow-Blohm], on technologies of the future in their fields of expertise.

Other negotiations are in progress; we are confident that they will materialize in the near future.

The working document attached, based on the work of a group of experts from industrial and research circles, aims at providing information on projects already finalized.

The industrial enterprises and research centers mentioned are likely to be interested in such projects.

Obviously, however, all industrial enterprises and research centers concerned must indicate their desire to associate and regroup themselves according to flexible formulas and variable configurations.

In addition, the first options selected represent "beacons" in the universe of high technologies; however, other projects could be explored profitably.

In the weeks and months to come, we shall have to continue our work in common in order to build progressively the Europe of high technologies.

The minister of foreign relations,
Roland Dumas

The minister of research and technology,
Hubert Curien

[Introduction]

In view of the considerable efforts made in the United States and in Japan, Europe--if it is to meet the technological challenges of the end of this century--must hasten to acquire the knowhow which, tomorrow, will be at the heart of the third industrial revolution. It must hasten to choose between options that will lead either to decadence or to the technological Renaissance of Europe.

In this respect, the next 15 years before the year 2000 will be decisive.

But we already know where to direct the bulk of our effort: information technologies, production technologies and the technologies of vegetal and living resources represent in fact the hard core of the knowledge and talents that will open to us the doors of the third millenium.

These techniques form a coherent whole, an original architecture whose components are computers and software, robots and "flexible" manufacturing plants, lasers and new materials, communications and transports, and finally the biotechnologies.

Our future hangs on the consolidation and strengthening of this knowledge and knowhow. They will condition our ability to renovate working conditions, renew human relations, remodel training, health and leisures... In a word, we must master these technologies to ensure our autonomy of decision and our independence.

This is why we must mobilize European energies and abilities on well-defined objectives and programs with clear goals. Five fields are decisive: data processing, telecommunications, robotics, materials and biotechnologies. Together, we must explore the frontiers of knowledge in these fields and master their practical applications.

The technological Renaissance of Europe will first require expertise in the technologies of information, production and vegetal and living resources.

Information technologies, which can be used in a multitude of fields by means of components and software, will open wide the road to the progress that will affect all other sectors of activity.

Components will be the "basic pawns" available to human ingenuity which will transform them into a variety of products and a multiplicity of services: artificial intelligence and expert systems will mobilize knowledge and, in time, make it more accessible. We shall have to analyze better and understand better, the better to transmit and communicate. Supercomputers, finally, will help us better manage organizations and better predict the evolution of natural systems, from meteorology to social security.

Tomorrow, the fate of our societies will largely depend on human communications. In this case, technology is bearing huge promises: voice, data, image transmission. Universities without walls and telecommuting. These are innovations of all kinds that will be made possible by a vast range of communication tools.

Then, production technologies, in the form of flexible and automated factories, will form the basis of new industrial forms. Instruments of negotiation between social groups, they will be the source of a veritable industrial renaissance. As for robots, beign mobile they will give us access to hostile worlds: ocean deeps, high pressures, extreme cold, space. They will also free us from dangerous and insalubrious work.

Finally, mastering the technologies of vegetal and living resources is crucial, as our food, our health, the revitalization of zones that are now desert depend on improved control and implementation of these technologies. Biotechnologies offer us solutions to develop and enrich our agricultural resources. Artificial seeds are thus signalling the dawn of a new agriculture.

Dominating the new era of information means:

First of all, designing and producing basic components, the indispensable elements of any automated system: microprocessors and memories. The "europrocessor" is at the heart of the Europe of the future.

1. Developing large-capacity computers;

2. Creating tools to design and develop artificial intelligence and expert systems;

3. Developing artificial organs to endow our automated systems with sight, hearing and touch.

Dominating the new era of communication means:

1. Establishing an optic communication network that will transport voice, data and image communications at low cost;

2. Enabling research centers to communicate through suitable networks, and enabling the machines of the future to dialogue through high-speed connections;

3. Mastering electronic imagery, because of its economic, and also because of its cultural impact.

Dominating the new era of automata means:

1. Designing a fully automated factory, i.e. setting up a communication network between automata. This prototype development should identify the conditions of transfer of automated systems to the medium-size businesses that form the bulk of the industrial fabric of European countries.

2. Developing laser and particle-flow machining and assembly. The cutting, assembly and surface-treatment of old and new materials will be transformed by these new tools which must be tested, developed, integrated into the actual industrial context.

3. Developing miniaturized and mobile robots to operate in extremely severe environments; e.g. a submarine robot and a robot to intervene in case of natural disasters.

4. Developing and embodying into mobile robots and automated factories all the available knowhow in optronics, new materials, energetics and communication.

Dominating the new era of vegetal and living resources means:

1. Developing artificial seeds adapted to soil and climate conditions.

2. Improving the conditions under which agrifood resources are processed.

3. Taking better advantage of ocean resources.

4. Controlling desert expansion.

The challenge is worthy of Europe:

- a Europe able to set clear objectives for itself;

- a Europe able to endow itself with simple and efficient tools to manage its research and development;

- a Europe able to meet the new challenges and to forget the internal barriers that were erected over the years;

- a Europe able to understand that the fragmentation of its energies and the scattering of its talents would lead to its decline; that the only guarantee of its Renaissance is a joint effort of all nations, all industries and all administrations.

Yesterday, among Europeans, we were able to master the stakes of energy and space. Our particle accelerators, our fusion and breeder machines, our aircraft, our space launchers, our satellites prove that we have already gone a long way. We must now work together on the key technologies of information, production and life.

Five programs materialize our determination to act: Euromatique, Eurobot, Eurocom, Eurobio, Euromat.

The minister of foreign relations,
Roland Dumas

The minister of research and technology,
Hubert Curien

5 Priority Goal-Oriented Programs

- Euromatique	Large computers Parallel architectures Artificial intelligence and expert systems High-speed silicon AsGa
- Eurobot	Third-generation robotics Automated factory, computer-aided design and manufacturing Lasers
- Eurocom	Research network Wideband-network equipment
- Eurobio	Artificial seeds Biomedical engineering
- Euromat	Ceramics turbine

This document is a synthesis of the work of expert groups from the industry and from the administration, organized in the context of the Eureka program. It presents a set of well-defined projects meeting the program's criteria. Other projects are still in the study stage and, they too, may be the subject of agreements.

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- 64-megabit memory
- Gallium arsenide components
- European custom circuit plant

Euria
- Line of symbolic machines
- Expert-system development tools
- Multilingual information system
- Control and monitoring of major industrial processes

Eurobots
- Civil-security robots
- Agricultural robot
- Flexible and automated factory for highly-integrated manufacturing
- CO_2, CO, excimer and free-electron lasers

Eurocom
- High-definition television

Eurobio
- Artificial seeds
- Alternate fuel

Small and Medium-Size Industries in Eureka

[I] Euromatique: Large Computers, Parallel Architectures, Artificial Intelligence and Expert Systems, High-Speed Silicon, GaAs

- Large vector computer
- Highly parallel computer architectures
- Synchronous-architecture multiprocessor machine
- Mass memory
- Software engineering center
- Dedicated circuits and line of symbolic machines
- Generalized tools for expert-system applications development
- Multilingual information system
- Control and monitoring of major industrial processes
- Europrocessor
- 64-megabit memory
- European GaAs-circuit plant
- European custom-circuit plant

Digital Computers - Parallel Architecture

- Large vector computer

Development of a 30-Gigaflops digital supercomputer by 1992 to carry out the simulations required to design complex systems (scientifique laboratories, aeronautics and automobile industries, meteorology, etc).

- Highly-parallel computer architectures

Development of a highly-parallel machine with a power in excess of 10 gigaflops by 1992.

- Synchronous-architecture multiprocesor machine

Development of a multiprocessor synchronous-architecture machine by 1992, for numerical analysis, signal and image processing.

- Mass memory

Development of large high-capacity storage disks for business-oriented and scientific large or medium-scale computers.

Software Engineering

- Software Engineering Center

Creation of a European software engineering center to coordinate R&D, dissemination and information operators.

Artificial Intelligence - Expert Systems

- Dedicated circuits and line of symbolic machines

Development, over 10 years, of a symbolic processor family (maximum power: 1 gigalips) and of the associated software for multiple applications in avionics, astronics or in the field of large industrial production units.

- Generalized tools for expert-system applications development

Research and development of tools for the development of expert systems and expert-system models.

- Multilingual information system

Natural-language querying and updating of databases that may contain text, graphic, image and voice data, with data-entry and operation in several languages.

- Control and monitoring of major industrial processes

Development, by 1990, of aids to process control integrating diagnostics, projections, decision-making and action follow-up.

Electronic Components

- Europrocessor

Development of a high-end flexible microprocessor in submicronic technology for the next decade; it should lead to the introduction of a standard.

- 64-megabit memory

Progressive development of memories of up to 64 megabits by 1995, with possible applications to other electronic components.

- European GaAs-circuit plant

Industrial development of high-speed GaAs components for civil applications and completion of a pilot plant within 5 years.

- European custom-circuit plant

Creation of a European technique-validation plant to be used also as a higher-training tool.

Eureka
Theme: Euromatique
Project Sheet: Large Vector Computer

[A] Description

Nature

Development of a very high-power vector machine.

Specific Interest

This type of machine has become a must to achieve the numeric simulations required for complex-system design.

Spinoffs

- Acquisition of knowhow by the industrial teams working on the project (hardware and software);

- Technological spinoffs as far as the high-speed and integrated electronic components required to make the hardware are concerned;

- European dependence on the United States and Japan, which is now absolute, will be reduced.

Basic Technologies Involved

- Computer architectures;
- Microelectronics;
- Networks;
- Computer-aided design.

Working Schedule Contemplated

- Objective

Development of a machine with the following characteristics:

- Peak power: 30 Gflops (3.10^{10} floating-point operations per second);
- Memory: one 64-bit Gword;
- Technologies: . operators: ECL [emitter-coupled logic]
  . registers: GaAs
  . memories: MOS [metal-oxide semiconductor]
- High-level languages: Fortran, Ada, C, etc.
- Tools for running associated programs in parallel.

- Working schedule
  - 1986 Preliminary study
  - 1986-1988 Technological studies
  - 1987-1988 Study
  - 1989-1991 Development of two prototpyes; software
  - 1992 Integration.

Launching Procedure - Management

Launching of a preliminary feasibility study and of technological studies with competent organizations in 1986 (decision late in 1985).

Depending on the results of these preliminary studies, decision to continue the definition studies of the machine and its software in 1987 and 1988 (decision late in 1986).

Decision to start the development of two prototypes late in 1988 (time required: 3 years).

To manage the project, creation of a Managing Committee (one co-manager to be appointed in each country) assisted by a technical working group of representatives of government departments, manufacturers and users from the countries concerned.

Creation of an industrial and financial entity.

[B] Possible Partners in France

- Manufacturers

Main partner: Bull
Possible cooperation from: Thomson, SINTRA [Industrial Company for New Radioelectrical Technologies and French Electronics]

- Public Organizations

ONERA [National Office for Space Studies and Research], INRIA [National Institute of Data-Processing and Automation Research]

[C] Possible Partners in Europe

- FRG: Siemens, etc.

[D] Benefits Derived From European Cooperation

- Opening new markets

- Contributions from experts, in particular in architecture and technology.

Eureka
Theme: Euromatique
Project Sheet: Highly-Parallel Computer Architectures

[A] Description

Nature

- Study of highly-parallel architectures
- Development of a machine.

Specific Interest

Highly-parallel architectures are a way of developing the supercomputers of the 1990's. They should lead to moderate-cost high-performance systems.

Spinoffs

Acquisition of knowhow in the field of high-performance computer-system architectures.

Basic Technologies Involved

- Supercomputer architecture
- Microelectronics
- Networks

Working Schedule Contemplated

- Objective
Development of a machine exceeding 10 Gflops by 1992.

- Working schedule
The project consists of two stages:

Stage 1: Study of an architecture leading to the development of a demonstration machine (power: 100 Mflops) by 1988. The goal is to demonstrate that this type of architecture can provide high performance over a broad range of applications.

Stage 2: Development of a highly-parallel machine (power in excess of 10 Gflops) by 1992.

The following points will be studied:
- Design and emulation tools for parallel architectures;
- Hardware and software control mechanisms;
- Programming tools;
- Development of specific numeric algorithms;
- Parallel memories;
- Communications between processors;
- Processor design;
- Technology.

Launching Procedure - Management

- Study stage to start already at the end of 1985;
- Decision to start stage 2 (development) early in 1988;
- As far as project management is concerned, the committee and technical group set up as part of the "Large Vector Computer" project may also monitor the "Highly-Parallel Architectures" project.

[B] Possible Partners in France

- Manufacturers

Bull, Thomson/SINTRA, etc.

- Public Organizations

CNRS [National Center for Scientific Research], INRIA, ONERA, etc.

[C] Possible Partners in Europe

In the first "study" stage, the broadest participation of European organizations is desirable.

The INRIA and the GMD [expansion unknown] (FRG) are already cooperating on the subject. Their cooperation could form the core of a European team enlarged to include other partners (e.g. Great-Britain, Italy).

[D] Benefits Derived From European Cooperation

Contribution of foreign expertise, especially with respect to parallel algorithms and vectorization, and also computer architectures.

Eureka
Theme: Euromatique
Project Sheet: Synchronous-Architecture Multiprocessor Machine

[A] Description

Nature

Development of a synchronous-architecture multiprocessor machine.

Specific Interest

This type of machine is required for:
- numeric analysis;
- signal processing;
- image processing.

Spinoffs

- Acquisition of knowhow by the industrial and public organizations working on the project (hardware and software);

- Contribution to the development of high-integration HCMOS [expansion unknown] circuit technologies and assembly technologies that could be used in the data-processing sector as a whole;

- Competitiveness on the market of high-power low-cost scientific-application computers.

Basic Technologies Involved

- Computer architectures;
- Microelectronics;
- Networks;
- Computer-aided design.

Working Schedule Contemplated

- Objective

- Peak power of about 2,000 megaflops (2.10^9 floating-point operations over 32 bits; $1.10.^9$ over 64 bits), for the best performance ratio (overall dimensions, dissipation/power).
- Memory of 100 32-bit megawords;
- Technology: HCMOS or AsGa operators; MOS memory;
- High -level languages: Fortran, Ada, etc.;
- CAD tools.

- Working schedule

- Study of machine parallelism;
- VLSI technological development, especially in HCMOS, for:

- Interconnection network;
- High-speed memory-processor link;
- Processing units.
- Improved assembly technologies:
    - Packages with a large I/O number;
    - High-density printed circuits.
- Languages and translation chains with automatic extraction of parallelism.

Launching Procedure - Management

Preliminary study and technological studies with competent organizations to start in 1986 (decision late in 1985).

Depending on the results of these preliminary studies, decision to proceed with the definition of the machine and its software in 1987 and 1988.

Decision to start development of a prototype around mid-1988 (time required: 2 years).

To manage the project, constitution of a Management Committee (one co-manager appointed in each country) assisted by a technical working group of representatives of government departments, manufacturers and users from the countries concerned.

[B] Possible Partners in France

- Manufacturers

- main partner: SINTRA (Thomson group);
- with the cooperation of: Thomson-Semiconductors, etc.

- Public Organizations

INRIA/IRISA [Data-Processing and Random-Systems Research Institute] (study of parallel architectures, tranlators), LASSY [expansion unknown] (CNRS laboratory in Nice), etc.

[C] Possible Partners in Europe

- Manufacturers represented on the data-processing market and with advanced knowhow in VLSI design (HCMOS process) and high-integration assembly technologies (INMOS [expansion unknown], GEC [General Electricity Company], Siemens, etc.).

- Research organizations competent in the fields of parallel architectures, parallel languages and associated translators (GMD, etc.).

[D] Benefits Derived From European Cooperation

- Expansion of the technical base of the project and improved technological level;
- Possibility of broader marketing.

Eureka
Theme: Euromatique
Project Sheet: Mass Memory

[A] Description

Nature

Study and development of large magnetic disks and, subsequently, large optic disks and their controllers.

Specific Interest

New very-large-capacity storage methods representing one subsystem essential to the operation of medium or large-scale business and scientific computers.

Spinoffs

Development of a European industry to counterbalance the international U.S. monopoly.

Basic Technologies Involved

Mastery of numerous technologies:
- Precision engineering;
- Aerodynamics;
- Magnetics;
- Chemical metallurgy;
- Optics;
- Magneto-optics.

Working Schedule Contemplated

- Objective
Development of large-capacity storage means by 1990.

Launching Procedure - Management

Creation of an industrial and financial consortium.

[B] Possible Partners in France

- Manufacturers

Bull, etc.

- Public Organizations

LETI [Electronics and Data-Processing Technology Laboratory], etc.

[C] Possible Partners in Europe

- FRG: BASF [Baden Anilin and Soda Factory], Siemens, etc.

[D] Benefits Derived From European Cooperation

- Pooling resources no single manufacturer could gather.
- Pooling scattered capital concerning magnetics, disks, recordings, etc.

Eureka
Theme: Euromatique
Project Sheet: Software Engineering Center

[A] Description

Nature

Creation of a software engineering center.

Specific Interest

- Coordination of R&D in software engineering;
- Dissemination of research results;
- Collection and reduction of data on software development.

Spinoffs

- Preparation of utilization standards for software-engineering technologies.

Basic Technologies Involved

Software engineering:
- methods;
- techniques;
- tools;
- plants, etc.

Working Schedule Contemplated

- Objective
Setting up the center.

- Working schedule

- Identifying the Center's objectives, major research fields, implementation stages;
- Setting up the observatory [as published] in the very near future;
- Starting R&D work;
- Progressive standardization of methods, techniques, tools, languages, documentation interfaces, etc.
- Collecting data from manufacturers;
- Developing corresponding means of analysis.

[B] Possible Partners in France

- Manufacturers

Aerospatiale, Bull, Cap Gemini, Renault, SSII [software engineering companies], etc.

- Public Organizations

INRIA, Saint-Etienne School of Mines, etc.

[C] Possible Partners in Europe

- Great-Britain: ICL [International Computer Limited], Logica, Scicon, etc.
- Netherlands: Philips, etc.
- FRG: AEG [General Electric Company], Dornier, MBB, Siemens, Aachen University, etc.

[D] Benefits Derived From European Cooperation

In time, use of similar and compatible methods and tools.

Eureka
Theme: Euromatique - Artificial Intelligence

Artificial intelligence is a relatively broad field, of a horizontal nature at applications level. Three complementary aspects, at various levels, are required if artificial intelligence is to be used efficiently in the future.

- Material level:
Symbolic machines and processors;

- Basic software level:
Software environment for symbolic data-processing;

- Application level:
Software tools oriented to expert-system generation and utilization.

Four specific sheets define specific fields of action:

- Dedicated circuits and line of symbolic machines;
- Comprehensive tools for the development of expert-system applications;
- Multilingual data-processing system;
- Control and monitoring of major industrial processes.

Generally speaking, the operators concerned might be the following:

- In France:

- Manufacturers

AMAIA [expansion unknown], Bull, CGE, CGEE [General Association of Electrical Companies]-Alsthom, Cognitec, Copernique, ESD [Serge-Dassault Electronics], Framentec, TITN [New Technologies Data Processing], etc.

- Public Organizations

CEA [Atomic Energy Commission], Cesia, CNET [National Center for Telecommunications Studies], EDF [French Electricity Company], IEF [Basic Electronics Institute], LRI [expansion unknown], Paris-7 University.

- In Europe

- Great-Britain: ICL, INMOS [expansion unknown], LPA [expansion unknown], SDL [expansion unknown], etc.
- Italy: Olivetti, etc.
- Norway: Norsk Data, etc.
- Netherlands, Philips, Amsterdam University, etc.
- FRG: GMD [expansion unknown], Krupp, Siemens, etc.

Eureka
Theme: Euromatique
Project Sheet: Dedicated Circuits and Lines of Symbolic Machines

[A] Description

Nature

Development of a family of symbolic processors and associated software to support and integrate major artificial-intelligence applications: expert systems, knowledge bases, form recognition, etc.

Specific Interest

- Providing more power to the hardware;
- Integrating hardware into a complex real universe where it is necesary and important that it should be placed.

Spinoffs

Multiple applications in avionics, in the space field and for large manufacturing units.

Basic Technologies Involved

- Study of the hardware architecture of symbolic processors;

- Study of creation techniques for basic artificial-intelligence languages: Lisp, Prolog and object-oriented languages;

- Study of the integration of more traditional concepts into these languages: system, real time, database.

Working Schedule Contemplated

- Objective
The ultimate objective is the Gigalips.

- Working schedule

Stage 1:
- Integration of the various software concepts andtheir extensions on parallel and distributed aspects;
- Construction of adequate hardware using existing components.

Stage 2 - Using basic software components:
- Study and construction of new symbolic machines;
- Full integration into advanced applications.

[B] Possible Partners in France.

- Manufacturers

AMAIA, Bull, CGE, CGEE-Alsthom, Copernique, MATRA, TITN, Thomson, etc.

- Public Organizations

CNET, IEF (Basic Electronics Institute), etc.

[C] Possible Partners in Europe

- Great-Britain: INMOS, etc.
- Norway: Norsk Data, etc.
- FRG: Siemens, etc.

[D] Benefits Derived From European Cooperation

Integrating developments now scattered among various European research centers (MAIA [expansion unknown], INMOS transputer, etc.).

Eureka
Theme: Euromatique
Project Sheet: Generalized Tools for the Development of Expert-System Applications

[A] Description

Nature

Development of a set of tools to develop expert systems.

Specific Interest

Making the expert-system technique available to European manufacturers in the near future.

Spinoffs

Multiple spinoffs in all industrial sectors.

Basic Technologies Involved

- Basic languages;
- Higher-level languages;
- Reproduction of reasoning, knowledge and learning;
- Man/machine interaction.

Working Schedule Contemplated

- Objective

Development of two sets of tools:
- Tools for the development of expert systems;
- Tools for the development of expert-system models.

- Working schedule

  - Study and development of tools to develop operational expert systems using well-established representation and inference techniques (stressing portability, opening to the outside world and performance);

  - Study and development of tools to develop system models (stressing power of expression rather than performance).

    Two stages:
    Stage 1: specification and validation through models;
    Stage 2: tool development.

[B] Possible Partners in France

- Manufacturers

Bull, CGE, Cognitec, ESD, Framentec, etc.

- Public Organizations

LRI (Orsay), Paris-7 University, etc.

[C] Possible Partners in Europe

- Great-Britain: ICL, LPA [expansion unknown], SDL, etc.
- Italy: Techint, TXT [expansion unknown], etc.
- Netherlands: Amsterdam University, etc.
- FRG: Danet, Siemens, etc.

[D] Benefits Derived From European Cooperation

Integration of scattered developments in the various European research centers.

Eureka
Theme: Euromatique
Project Sheet: Multinlingual Information System

[A] Description

Nature

Natural-language querying and updating of comprehensive databases, i.e. databases that could contain text, graphics, images and possibly voice data.

Specific Interest

Entry and operation possible in various languages.

Spinoffs

Possibility of adding aids to translation.

Basic Technologies Involved

- Logic programming;
- Knowledge bases;
- Architecture;
- Man/machine interaction.

Working Schedule Contemplated

- Objective

Development of the system within 10 years.

- Working schedule

Representation of comprehensive electronic documents taking into account the logic and material structure of a document as well as its semantic content;

Comprehension of national languages and definition of a single European-language interface for document representation;

Man/machine interface at an individual work station to create, edit and alter electronic documents;

System for the acquisition and semantic analysis of "paper" documents prior to their entry into the world of electronic documents;

High-performance archival station provided with a database-management system suitable for storage and filing, for electronic-document querying (parallel-

architecture station including data-processing symbolic operators, screening operators, and accelerators of access to data stored in secondary memory);

Communication architectures and communication protocols between work stations and servers interconnected by a local-area or a long-distance network;

Aids to automatic translation, supported by the document database.

Launching Procedure - Management

Association of artificial-intelligence experts, manufacturers, service companies and pilot users.

[B] Possible Partners in France

- Manufacturers

Bull, CGE, etc.

- Public Organizations

INRIA, etc.

[C] Possible Partners in Europe

- Great-Britain: ICL, etc.
- FRG: GMD, Siemens, etc.

[D] Benefits Derived From European Cooperation

Rationalization, rapprochement and efficiency factor; cooperation in this field is self-evident.

Eureka
Theme: Euromatique
Project Sheet: Control and Monitoring of Major Industrial Processes

[A] Description

Nature

Study and develoment of tools making it possible to build control-aid systems integrating diagnostic, projections, decision-making and intervention follow-up in the field of industrial processes.

Specific Interest
Crucial application for economic and safety problems.

Spinoffs

Numerous industrial applications:
- Search for complex optimization compromises (quality, energy economy, etc.);

- Search for complex scheduling compromises;
- Diagnostic and emergency repair of the process or electronic equipment;
- Operator training.

Of interest to all large project owners and prime contractors.

Basic Technologies Involved

- Knowledge-representation techniques (formalism derived from logic, models, simulation, plans, etc.);
- Expert systems;
- Symbolic arrays;
- Ergonomics.

Working Schedule Contemplated

- Objective

Specification, then experimental implementation in one sector.

- Working schedule

- Study of time-representation techniques;
- Study of techniques for the qualitative representation of physical phenomena;
- Study and development of drawing generation and execution systems;
- Integration of the latest progress achieved in the field of expert systems;
- Development of evolutive hardware tools and their interfaces;
- Study of the man/machine interface;
- Implementation of deductive or associative-access databases;
- Consideration of implementation procedures.

[B] Possible Partners in France

- Manufacturers

Aerospatiale, CGE, etc.

- Public Organizations

CEA, CNES, EDF, etc.

[C] Possible Partners in Europe

- Netherlands: Philips, etc.
- FRG: Krupp, MBB, Siemens, etc.

[D] Benefits Derived From European Cooperation

Pooling study resources and broadening the potential market.

Eureka
Theme: Euromatique
Project Sheet: Europrocessor

[A] Description

MERCURE: European Microprocessor with Error-Proof Universal Connection Network

Nature

Study and development of a high-end flexible microprocessor in submicronic technology, for the next decade.

Specific Interest

Develoment of high-end microprocessors whose design and develoment will power advanced developments in the integrated-circuit and image-processing industry, a field in which the United States have a de facto monopoly. This new-generation processor is suitable for parallel processing

Spinoffs

- Development of a European integrated-circuit industry;
- Multiple applications in most large electronic and data-processing equipment;
- Major driving effect on the data-processing, electronic and telecommunications industries.

Basic Technologies Involved

- Micronic and submicronic technology (10^6 transistors per chip);
- Object-oriented parallel architecture;
- Software engineering.

Working Schedule Contemplated

- Objective
Development of the microprocessor by 1990.

- Working schedule

Development of the technology concerned:
- Performance definition;
- Definition of silicon-components;
- Definition of software tools;
- Pilot applications.

Software
- Core;
- Software-engineering workshop;
- Compilers.

Tests
- Validation with a scanning microscope;
- Production tests;
- Internal tests.

Complex-machine architecture
- Multiprocessor;
- Tolerance to failure;
- Distributed addressing;
- Data consistency.

Launching Procedure - Management

- Manufacturers' agreement on joint development, including a strategy leading to its adoption as a standard.

[B] Possible Partners in France

- Manufacturers

Thomson, etc.

- Public Organizations

CEA/LETI, CNET, etc.

[C] Possible Partners in Europe

- Great-Britain: GEC, INMOS, Plessey, etc.
- Netherlands: Philips, etc.
- FRG: Siemens, etc.

[D] Benefits Derived From European Cooperation

Cooperation is necessary to adopt a new standard; it is the only way to gather the resources required for a program of such a scope.

Eureka
Theme: Euromatique
Project Sheet: 64-Megabit Memory

[A] Description

Nature

Development of a 64-megabit dynamic RAM memory.

Specific Interest

Setting an ambitious objective to mobilize operators, and making intermediate stages possible.

Spinoffs

- Development of a European dynamic-RAM industry;
- Helping European industry catch up;
- Mastering a technology applicable to components other than memories.

Basic Technologies Involved

- Research on machines and basic technology;
- Research on memory point structure;
- Research on memory organization.

Working Schedule Contemplated

- Objective

Development of a 64-megabit memory by 1995.

- Working schedule

- Progressive development of components with increasing performance characteristics;
- Study of critical equipment for these structures of a size below 0.5 micron (lithography, scouring, automatic marking, white room);
- Technology and design of 3-D cells;
- Development of any non-available equipment;
- Construction of a pilot line.

Launching Procedure - Management

Constitution of a manufacturers' consortium.

[B] Possible Partners in France

- Manufacturers

Thomson, etc.

- Public Organizations

CEA/LETI, CNET, etc.

[C] Possible Partners in Europe

- Great-Britain: GEC, etc.
- Netherlands: Philips, etc.
- FRG: Siemens, etc.

[D] Benefits Derived From European Cooperation

Intensification of French participation in already existing projects between European manufacturers (Siemens and Philips' development program for 4-megabit memories).

Eureka
Theme: Euromatique
Project Sheet: European GaAs Circuit Plant

[A] Description

Nature

To achieve progress in high-speed component technologies, in particular GaAs components (e.g. pilot unit, foundry, etc.).

Specific Interest

- Transforming the high level achieved by European research on high-speed GaAs digital circuits into an industrial activity;

- Forming partnerships among European manufacturers in order to minimize the heavy initial investments required to acquire a strong position on a still weak international market within the next 3 to 4 years.

Spinoffs

In addition to military applications, the market for this type of civil-application components is likely to expand considerably if prices are considerably reduced:

- High-end data-processing equipment and supercomputers;
- Equipment related to control, maintenance, management and storage (energy).

Basic Technologies Involved

- TEGFET [two-dimensional electron-gas field-effect transistor] DCFL [expansion unknown] circuits;
- Three times faster than silicon for an equal consumption;
- 10,000 to 20,000 gates per chip;
- Applications:
    - Cache memory;
    - Arithmetic and logic units;
    - Signal processing;
    - High-speed random logic.

Working Schedule Contemplated

- Objective
Industrialization of European research in the sector.

- Working schedule

Construction of a European pilot plant;

Developments (carried out synergistically with silicon activities):

- Computer-aided design;
- Development of standard cells;
- Materials (zero defect);
- Packaging;

Looking for an agreement with one or several U.S. companies to gain access to the U.S. market.

Launching Procedure - Management

Creation of a European industrial consortium and of a European industrial program-management "entity."

[B] Possible Partners in France

- Manufacturers

Crismatec, MATRA, Thomson, etc.

- Public Organizations

CNET, CNRS, etc.

[C] Possible Partners in Europe

- Great-Britain: GEC, Plessey, STC, etc.
- Netherlands: Philips (LEP [Electronics and Applied Physics Laboratories] etc.
- FRG: Siemens, etc.
- Sweden: LME, etc.

[D] Benefits Derived From European Cooperation

Concerted research on all existing processes:

- coordination of efforts;
- reduction of R&D costs.

Eureka
Theme: Euromatique
Project Sheet: European "Custom" Circuit Plant

[A] Description

Nature

Development of the (proven and "mixed") technologies involved in a joint prototype plant.

Specific Interest

Development of techniques to design, produce and test complex signal-processing digital circuits much faster than it is possible today.

Spinoffs

Associating a higher training center to this plant, which will use the same equipment.

Basic Technologies Involved

Two approaches:
- 1.2-micron CMOS-type technologies;
- Compatible CMOS-bipolar type technologies.

Working Schedule Contemplated

- Objective
Rapid development of studies, then full-scale analysis.

- Working schedule

Studies to be undertaken:
- Simulation and modelling;
- Creation of a European library of micro and macrocells;
- Development of routing and interconnection software and of associated test-definition software;
- Assembly and interconnection methods;
- Testing means.

Means to be used :
- Creation of a joint European prototype plant, first using proven technologies to validate the techniques, and then a mixed technology well suited to this type of application.

Launching Procedure - Management

Creation of a professional technical center.

[B] Possible Partners in France

- Manufacturers

MATRA, Thomson, etc.

- Public Organizations

CNET, LETI, etc.

[C] Possible Partners in Europe

- Great-Britain: GEC, Plessey, etc.
- Netherlands: Philips;
- FRG: MBB, Siemens, etc.
- Sweden: LME.

[D] Benefits Derived From European Cooperation

Multiplicity of partners within a "professional center."

[II] Eurobot: Third-Generation Robotics, Automated Factory/Computer-Aided Design and Manufacturing, Lasers

- Civil-security robots
- Agricultural robots
- Automated factory/computer-aided design and manufacturing (CAD/CAM)
- CO_2, CO, excimer and free-electron lasers

Third-Generation Robotics

- Civil security robots

Development of self-controlled modular civil-security robots to replace man in high-risk jobs or jobs that cannot done by man.

- Agricultural robots

Development of a fully-automated programmable tractor that would increase the efficiency and value of agricultural work.

Automated Factory-CAD/CAM

- Highly-integrated automated and flexible manufacturing plant

Development of a plant which, in an industrial context, would integrate the product-design, management, production, manufacturing, administration and sales functions and would produce marketable goods, with a view to solving the technical, organizational and human problems not yet fully under control today.

CO_2, CO, Excimer and Free-Electron Lasers

Research and development of high-yield, high-power, high-penetration and/or high-collimation power-lasers for applications in industrial machining and assembly.

Eureka
Theme: Eurobot - Third-Generation Robotics

To develop third-generation robotics in Europe by means of a number of goal-oriented subprograms, each of which would be headed by a manufacturer, and

which would associate manufacturers, research centers and universities in European consortia.

- Robots to operate in the nuclear industry
- Civil-security robots
- Mining robots
- Robots for ocean environments
- Agricultural robots
- Industrial-cleaning robots
- Robots for civil engineering and construction
- Household robots

Three projects from this list could be implemented by priority:

- Civil-security robots
- Agricultural robots; and possibly
- Robots for ocean environments.

Generally speaking, the operators could be the following:

- In France:

- Manufacturers: Bull, CGE, Dassault, Renault, SAGEM [Company for General Applications of Electricity and Mechanics], SIETAM [expansion unknown], Thomson, etc.

- Laboratories: CEA, CNES [National Center for Space Studies], IFREMER [French Institute for Research on Ocean Development], IIRIAM [Marseilles International Institute for Robotics and Artificial Intelligence], LAAS [Automation and Systems Analysis Laboratory], LETI, etc.

- In Europe:

- Belgium: FN [Herstal National Factory], etc.
- Great-Britain: GEC, Lamberton, Meta Machines, Taylor Hitec, etc.
- Italy: Ansaldo, Comau, Elsag, Mectron (STET [Telephone Finance Corporation]), Olivetti, RSE [expansion unknown], etc.
- FRG: Fels, Fibro, Kuka, Siemens, etc.
- Sweden: ASEA [Swedish General Electric Corporation], etc.

Eureka
Theme: Eurobot
Project Sheet: Civil-Security Robots

[A] Description

Nature

Development of modular civil-security robots to meet the following fonctional requirements:

- Autonomy of movement

- Autonomy of decision
- Action on the environment
- User-friendly man/machine interface
- Cooperation and coordination.

The modular approach adopted makes it possible to contemplate designing and developing a line of robots that could operate in the following environments:

- Environments presenting natural hazards
- Environments presenting man-made hazards

to carry out the following tasks:

- Mine removal
- Fire-fighting
- Natural disasters, earthquakes
- Pollution control
- Monitoring
- Operations in radioactive, chemical and high-temperature environments.

Robots could replace man in high-risk tasks or tasks that man cannot carry out himself. They will thus preserve and save human lives.

Specific Interest

The emphasis placed on the modular design of robots will make it possible, on the one hand, to intensify appreciably the efforts undertaken in the generic technologies required for third-generation robotics and, on the other hand, to integrate these technologies into subsystems or modules suitable for the functions required in the environment considered.

With the modular approach, we can both develop generic R&D and have goal-oriented projects.

Spinoffs

In addition to scientific and technological spinoffs, there will be a considerable and rapid contribution to industrial robotics and to computer-integrated manufacturing.

Actually, any research we start must make it possible to design new robot architectures, to use new materials (gains of weight, speed, precision, cost, etc.), to improve man/machine interfaces, to increase decision autonomy (adaptation to environmental changes), etc., and possibly to experiment with cooperation among several robots, either to carry out a set of production tasks or for maintenance operations.

Without waiting for the development of applied robots for specific sectors, the technologies developed could be transferred to industrial robotics progressively as they are developed.

Basic Technologies Involved

As far as R&D is concerned, the development of such machines supposes that the following problems have been brought under control:

- Autonomy of self-standing on-board energy:
    - Lightweight materials
    - Locomotion
    - Navigation/guidance
- Autonomy of decision:
    - Sensors
    - Expert systems to generate drawings, artificial intelligence
- Action on the environment:
    - Arms
    - Operating organs ["effectueurs"]
    - Actuators
- Cooperation/coordination:
    - Communication networks between robots
    - Interfaces
    - Telepresence [as published]
- Resistance to the environment.

Working Schedule Contemplated

- Objective

- Creation of European workshops on themes that should be:
    - Goal oriented
    - Transversal: signal processing, navigation, energy storage, materials, micromechanics, ad-hoc hardening of technologies to reflect their specific applications, etc.;
- Contributions to the definition of European standards and compatibility rules;
- Creation of European experimentation and evaluation sites.

- Working schedule

5 stages:
1. Product and module definition;
2. Definition and implementation of R&D programs;
3. R&D evaluation as a function of defined products and modules;
4. Module integration, completion and testing;
5. Robot integration, completion and testing.

Launching Procedure - Management

Appointment of a project leader (agency created for a temporary period and supported by national relays, with respect to R&D as well as industrialization and marketing) to prepare, issue and study calls for bids, to appoint prime contractors (consortia of firms) and subcontractors, and to follow up and control the delivery of studies and the overall project financing.

[B] Possible Partners in France

- Manufacturers

CAMIVA [Associated Manufacturers of Fire-Fighting, Refuse-Collection and Aviation Equipment], G3S [expansion unknown], GIAT [expansion unknown], Hispano-Suiza, Technicatome, etc.

- Public Organizations

ADI [Data-Processing Agency], CEA, CEA/OREP [expansion unknown] CERT [Toulouse Study and Research Center], CESTA [Aquitaine Scientific and Technical Study Center], CNRS, INRIA, associated laboratories, etc.

[C] Possible Partners in Europe

- Great-Britain: Taylor Mitec, etc.
- Italy: FIAR [expansion unknown], Mectron, etc.

[D] Benefits Derived From European Cooperation

- Project requiring the mobilization of R&D capacities outside of the national context;
- Creation of a European supply on an expanding market;
- Encouraging the recovery of European supply in robotics and computer-integrated manufacturing.

Indeed, although the above-mentioned R&D orientations are clearly identified and are covered by current research projects, the scope of the goals set goes well beyond national R&D capacities; therefore, launching such a project at European level will make it possible to coordinate, or even to federate national R&D efforts in third-generation robotics and to accelerate their completion. In addition, a goal-oriented project will make it possible to ascertain European manufacturers' interest in, and commitment to taking position on a developing market already penetrated by the Americans and the Japanese.

Eureka
Theme: Eurobot
Project Sheet: Agricultural Robots (Automatic Tractor)

[A] Description

Nature

Development of a fully-automated programmable tractor meeting the following functional requirements:

- Autonomy of movement in unimproved environment;
- Autonomy of decision;
- Autonomy on the environment (plantation, crop, etc.);
- User-friendly man/machine interface.

These machines will have to be able to move about on any kind of terrain and in contact with living organisms (plants, animals) under highly variable temperature, humidity and light conditions and in the presence of dust and vibrations.

Specific Interest

- Improving the efficiency and value of agricultural work, making tasks less tedious. Possibility of working on hard-to-cultivate land.

- Bringing various research fields to interact in order to develop a tractor that will operate in unimproved natural environments.

Spinoffs

- Economic: avoiding crop losses as a result of bad weather;
- Social: restoring value to agricultural work.

Basic Technologies Involved

The problems are threefold:

- Mechanical: driving on all terrains, variety of tools, platform stability, etc.;
- Sensors: optical, thermal, mechanical, position sensors;
- Data-processing: the data-processing capabilities of these robots will have to integrate the latest results of artificial-intelligence research.

Working Schedule Contemplated

- Objective

- Creation of European workshops on themes that are:
    - goal oriented;
    - transversal: signal processing, navigation, energy storage, micromechanics, ad-hoc hardening of technologies corresponding to their specific applications, etc.
- Contribution to the definition of European standards and compatibility rules;
- Creation of European experimentation and evaluation sites.

- Working schedule:

5 stages:
1. Product and module definition;
2. Definition and implementation of R&D programs;
3. Evaluation of R&D as a function of defined products and modules;
4. Module integration, completion and testing;
5. Machine integration, completion and testing.

[B] Possible Partners in France

- Manufacturers

Renault, etc.

- Public Organizations

- ADI, Cemagref, CNRS, INRIA, etc.

[C] Possible Partners in Europe

- Italy: Fiat, etc.
- Sweden: Saab, etc.

[D] Benefits Derived From European Cooperation

Rapidity of implementation, pooling of multiple competence.

Eureka
Theme: Eurobot
Project Sheet: Highly-Integrated Automated and Flexible ManufacturingPlant - CAD/CAM

[A] Description

Nature

Development of an automated and flexible plant in an industrial context and through advanced data-processing and robotics systems, to provide integrated functions of product design, production management, manufacturing as well as administration and marketing (CAD, CAM, computer-aided production management, CAX [computer-aided X], etc.

This plant will have to produce marketable goods. The line of goods produced would meet one of the four following criteria:

- Goods for which the European industry is not represented;
- Goods having humanitarian functions (Third-World markets, equipment for the handicapped);
- Goods currently produced by European consortia;
- Prototypes (under certain conditions to be defined)>

Other types of goods can of course be contemplated (components manufactured in white rooms).

Among the various manufacturing processes, assembly/installation will receive special attention. In addition, the project shall have to rely not only on technical, but also on socioeconomic and organizational knowledge.

Specific Interest

Development of an operational unit implying that a solution is found to technical, organizational and human problems not yet fully solved today:

- Development of advanced-design components and subsystems:
    - Distributed and heterogeneous data processing;
    - Industrial local-area networks;
    - Robotized assembly cells;
    - Software for real-time management of production, for quality and maintenance management;
    - Distributed CAD, CAX systems;
    - Man/machine communication interfaces.

- Expertise in communication methods and techniques with reference to integration and man/machine relations:
    - Reference models (factory, factory environment, etc);
    - Communication protocols.

Spinoffs

- Scientific spinoffs
    - Real-time data processing;
    - Artificial-intelligence techniques and expert systems;
    - Optic communication systems, etc.

- Economic spinoffs:
    - Restructuring the demand to optimize the equipment lines offered and their manufacturing conditions, etc.

- Human spinoffs:
    - Design and implementation of innovative management methods with respect to organization and to operators' training and hiring, etc.

Basic Technologies Involved

- Artificial intelligence;
- Microelectronics;
- Optronics;
- Telecommunications: networks.

Working Schedule Contemplated

- Objective

The goal is not to design and implement a factory without workers, but a factory where all technical, organizational and human components are taken into account simultaneously.

- Working schedule

Four stages are contemplated:

1. Study and specifications;
2. Development and implementation;

3. Testing and evaluation;
4. Demonstration, training and production.

Launching Procedure - Management

Appointment of a project leader (agency created for a temporary period) to prepare, issue and study calls for bids, to appoint prime contractor (consortia of firms) and subcontractors, and to follow up and control the delivery of studies and the overall project financing.

The project leader will pilot the above-mentioned Stages 3 and 4. For stage 4, depending on the nature of the goods produced, marketing/distribution procedures remain to be defined.

[B] Possible Partners in France

- Manufacturers

Aerospatiale, Industrial Automation, CGE, MATRA, Peugeot, Renault Automation, SGN [General Company for New Technologies], Sodeteg Tai, etc.

- Public Organizations

ADEPA [Agency for the Development of Automated Production], ADI, CEA, CERT, CESTA, CNRS, INRIA, associated laboratories, etc.

[C] Possible Partners in Europe

- Great-Britain: GEC, etc.
- Italy: FIAR [expansion unknown], Fiat, Olivetti-Osai, RSE (STET group), etc.
- FRG: Siemens, etc.
- Sweden: ASEA, etc.

[D] Benefits Derived From European Cooperation

- Implementation of research carried out under Community programs: BRITE [Basic Research on Industrial Technologies for Europe], ESPRIT [European Strategic Program for R&D in Information Technology] (project finalization);

- Will amount to a European proposal for standardization of computer-integrated manufacturing [CIM];

- Structuring CIM at European level.

Eureka
Theme: Eurobot
Project Sheet: CO_2, CO, Excimer and Free-Electron Lasers

[A] Description

Nature

Study and development of high-yield, high-power, high-penetration and/or high-collimation power lasers.

Specific Interest and Spinoffs

Preparing the tools of the future integrated factory.

Basic Technologies Involved

- Plasma physics;
- Vacuum physics;
- Power follow-up control;
- Power electronics, servo-mirrors.

Working Schedule

1. CO_2 Laser

- Development of operational CIM tools: continuous lasers (10 microns) with a power in excess of 50 KW;
- Making a European tool available to major specialized laboratories;
- Development of an industrial source.

2. CO Laser

- Research and development of CO lasers continuous at room temperature, of average power (of the order of 5 KW) and with yields in excess of 20 percent (5.2 to 5.5 microns).
- First stage: power of a few tens of watts for communications, surgery.
- Second stage: power of a few watts for machining.

3. UV Lasers

- Research and development of high-power (1 kW and over) excimer lasers. Definition of a line of tools for treatment and machining;
- Research and development of excimer lasers (KeF, XeF) of a few joules, for micro-machining.

4. Free-Electron Laser

- Research on the potential of free-electron lasers. Development of prototypes of a few kilowatts.

Launching Procedure - Management

Consortium of European partners for each of the operations selected.

[B] Possible Partners in France

- CO_2 Alsthom, CGP [General CIM Company], CILAS [Laser Industrial Company], ETCA [Central Technical Establishment for Armament], FRAMATOME [Franco-American Atomic Construction Company], GIAT, MATRA, SGN, etc.
- CO: CILAS, etc.
- UV: CERCO [expansion unknown], CILAS, CIT [Industrial Telecommunications Company], CNET, ETCA, IMFM [expansion unknown], LDM [expansion unknown], LETI, Micro-Controle, SOPRA [expansion unknown], Thomson, Usinor, etc.
- Free-electron: CEA, etc.

[C] Possible Partners in Europe

CO_2:

- Belgium: CBL [expansion unknown], etc.
- Great-Britain: Ferranti, etc.
- Norway: Dama, Nurks, etc.
- FRG: Rofins Union, etc.

CO:

- Great-Britain: Ferranti, RSBE [expansion unknown], etc.
- FRG: DFVLR [German Research and Development Institute for Air and Space Travel), MBB, etc.

UV:

- Great-Britain: AWRE [expansion unknown], JK Lasers, etc.
- FRG: Garching, MBB-Lasau, etc.

[D] Benefits Derived From European Cooperation

- CO_2: sharing expenditures and markets;
- Others: expenditure-sharing and optimum use of resources, in particular human resources.

Appendix

CO_2-Laser CIM

The carbon-dioxide power laser is a tool which can be used on a wide range of materials: metals, alloys, ceramics, etc., and which can fulfill many functions: machining, welding, treatment, etc.

Possessing many qualities, it makes it possible to operate at very high speeds and is suitable for automation. In addition to the development of laser sources whose power would range from 1 kW to a few tens of kW, laser CIM

requires considerable progress of optical components, sensors and the control/command methods of processes whose basic physical mechanisms often still remains to be clarified. The robotization of laser processes will call for the design of original robots with large-dimension hollow axes, and above all for a thorough revision of present production methods, as laser CIM will make it possible to finish products (car frames, airframes, etc.) after the blanks have been assembled.

Continuous Carbon-Oxide Laser

The project consists in studying the possibilities of making continuous CO lasers operating in the neighborhood of room teperature. In a first stage, the project will consider small-size continuous lasers whose power will be limited to a few tens of watts. The main applications contemplated are long-distance communications and the medical field (surgery). The major advantage of CO laser, in addition to its yield which generally exceeds 20 percent, is its spectral emission range (5.2 to 5.5 microns) which makes it possible to transport beams through minimal-loss low-dispersion optical fibers (fluorinated glass). In a second stage, the project will consider the possibility of developing an industrial CO laser (power of a few kW) and the problems posed by the transport of a high-power beam through an optical fiber.

UV-Laser Micromachining

The development of excimer-type ultraviolet lasers is opening new prospects in the field of micromachining by very-high-resolution photochemistry. The energy of UV photons can be used for gravure, photodeposition or photopolymerization of a great many materials used in microphyusics, and in particular in microelectronics. The program may bear on the development of gas-phase or liquid-phase micromachining processes. Simultaneously, the study would bear on the development of various KeF or XeF excimer laser components possessing great homogeneity over an eight-inch section, reliable and with good power stability (10 joules per pulse at a few Hertz):

- optics: of lithographic-quality focusing, and displacement mechanics [as published] of very high precision;
- devices: optics for real-time position measurement with 0.1 micron;
- diagnostic: real time of gravure or deposition kinetics;
- formulation: of resins suitable for UV photo-ablation or photo-polymerization.

Surface Treatments Using High-Power UV Lasers

For machining and for the surface treatment of metallic and especially organic materials, pulsed excimer lasers offer possibilities that have hardly begun to be explored. One of the most outstanding results, photo-ablation in plastics or organic materials (bone, cartilage, teeth, cornea, etc.) is especially interesting because of the small extension or complete lack of thermally affected zone. The LSA (laser-supported absorption) conditions that have been shown to exist in metals will lead to new possibilities to obtain an amorphous surface and/or achieve impact hardening (placing the material in a pre-

stressed condition). The progress of this research will require the development of a testing device built around an excimer laser of medium high power (1 kW) and high repetition rate (about 1 kHz) based, for reasons of reliability, on the technique of discharge photo-triggered through pre-ionization.

[III] Eurocom: Research Networks, Wideband Network Equipment

- Data-processing networks for research
- Large European digital switch
- Wideband data-processing and automated office communications
- Wideband transmission

Data-Processing Networks for Research

Project aimed at promoting the development of data-processing networks for research and their interconnection between European countries, as an efficient joint system of information management is a prerequisite for European technological development.

Large European Digital Switch

Research and development of a public automatic switch for the future wideband digital network.

Wideband Data Processing and Automated Office Communications

Development of the equipment intended for users of the future wideband digital network.

Wideband Transmission

Research and development of long-distance transmission means for the future wideband digital network: fiber optics, satellite payloads.

Eureka
Theme: Eurocom
Project Sheet: Data-Processing Networks for Research

[A] Description

Nature

Creation of data-processing networks connecting the various operators and users of research at European level.

Specific Interest

The level of expertise in data-processing technology conditions the rate of progress of sciences and technologies; it provides indispensable supports to training, scientific exchanges and the storage of data and methods.

Spinoffs

The communication networks established in the world or research play a leading role in the development of new products and in the promotion of original methods; as a result, they have a driving effect on the industry and on the economy.

Basic Technologies Involved

Materials: transmission supports (satellites, optical fibers), general-purpose or specialized machines in large serving centers, storage means, "work stations," specialized (speech, text, image) terminals.

Creation of associated software, definition of standards or development of bridges.

Working Schedule Contemplated

- Objective

Coordinating and connecting communication systems used for research in various countries, with respect to the following:

- data processing:
Interactivity with non-specialization of terminals, virtual terminal;
Remote-submission of work;
File transfer;
Graphics.

- data communications:
Videotex;
Teletex;
Telefax.

- office automation:
Word processing;
Messaging: data; text.

- computerized conferencing (Forum).

- Working schedule

Promoting the development of data-processing networks for research in all European countries. Providing national-network interconnection under the best possible conditions.

Launching Procedure - Management

Definition, by the countries concerned, of a cooperation structure to ensure the development and interconnection of national systems.

[B] Possible Partners in France

- Manufacturers

Bull, etc.

- Public Organizations

MRT [Ministry of Research and Technology], CNRS, INRIA, etc.

[C] Possible Partners in Europe

Research centers and national data-processing networks.

[D] Benefits Derived From European Cooperation

The continued implementation of data-processing networks for research and their interconnection on a European scale is a prerequisite to the technological expansion of Europe. Active cooperation, leading to a measure of joint network management and promoted to the largest possible extent, will accelerate network implementation and facilitate their interconnection.

Eureka
Theme: Eurocom
Project Sheet: Large European Digital Switch

[A] Description

Nature

Development of an ISDN (integrated services digital network) switch of large capacity (over 100,000 lines) and wide band (64 kbit/s to 8 Mbit/s, with a throughput rate that could reach 34 or even 140 Mbit/s).

Specific Interest

To provide Europe with a major piece of equipment controlling the development of an all-digital wideband network.

Spinoffs

Development of the network, peripherals, terminals, services.

Basic Technologies Involved

- Research on architectures;
- Programming language;
- Specific components;
- Wideband connection matrix;
- Real-time software for communications processing, for operations and man-machine relations.

Working Schedule Contemplated

- Creation of a European consortium;
- Definition of specifications;
- Research and development;
- Equipment installation.

[B] Possible Partners in France

- Manufacturers

CIT-Alcatel, component manufacturers, etc.

- Public Organizations

DGT [General Directorate of Telecommunications], CNET, ETC.

[C] Possible Partners in Europe

- Great-Britain: Plessey, etc.
- Italy: Italtel, etc.
- FRG: Siemens, etc.

[D] Benefits Derived From European Cooperation

- Sharing expenditures;
- Opening public markets at European level;
- Standardization of European equipment.

Eureka
Theme: Eurocom
Project Sheet: Data Processing and Wideband Automated Office Communications

[A] Description

Nature

Development of equipment for the wideband ISDN to transport all information-distribution services, including videocommunications.

Specific Interest

Development of telecommunication systems which, while offering the "voice, data, fixed images" services of the "narrow-band" ISDN currently being set up, will allow general use of the interactive "high-quality moving images" service (video channel) for professional and industrial as well as for consumer applications.

Spinoffs

Development of the equipment-manufacturing industry and of services.

Basic Technologies Involved

- Research on architecture;
- Programming languages;
- Electronic components;
- Wideband and very-wideband connection matrix;
- Real-time software for communications processing, for operation and for man-machine relations;
- Very-high throughput bus;
- Archiving on digital optical disk;
- Confidentiality systems.

Working Schedule Contemplated

- Specification of standards;

- Development of small-capacity multiservice switches (essentially PABX [private automatic branch exchanges]) with very wide band (64 kbit/s to 34 Mbit/s and 140 Mbits/s);

- Development of consumer-oriented wideband interactive communication terminals (64 kbit/s to 8 Mbit/s): high-resolution low-priced color equipment (cameras, videotape recorders, receivers, projectors, etc.);

- Development of an extensive line of professional equipment to be connected to the digital ISDN network:
    - office work stations (64 kbit/s to 8 Mbit/s, 34 Mbit/s and 140 Mbit/s): wideband videotex, computer-aided instruction, computer-aided design, etc.
    - data-processing communication peripherals (64 kbit/s to 34 or even 140 Mbit/s): high-speed color printers, image-processing terminals, front-end communication equipment, file transfer, etc.
    - 34 Mbit/s videoconferencing;

and in particular:

- high-definition A4-size screens;
- document encoding by high-resolution scanners;
- archiving on digital optical disks;
- high-resolution high-speed telefax terminal;
- special software for high-throughput multiwindows;
- screen copying and printer modules;
- simplification of man-machine relations, ergonomics;
- image synthesis and processing software;
- data compression.

- Develoment of distributed multi-user data servers with very high capacities and throughput rates, and associated means of communication.

Launching Procedure - Management

- Creation of European manufacturers consortia.

- Joint specification and development of key network and system components (optoelectronics, high-speed integrated circuits).

[B] Possible Partners in France

- Manufacturers

CGE (CIT-Alcatel), SSII, Thomson, equipment and component manufacturers, etc.

- Public Organizations

CNET, PTT [Post and Telecommunications Administration], etc.

[C] Possible Partners in Europe

- Great-Britain: British Telecom, General Electric, Plessey, etc.
- Italy: Italtel, etc.
- FRG: Federal Post Office Administration, Nixdorf, Siemens, etc.

[D] Benefits Derived From European Cooperation

Sharing the effort made to develop specific (switching, transmission) systems for "wideband" applications.

Eureka
Theme: Eurocom
Project Sheet: Wideband Transmission

[A] Description

Nature

Systems for digital transmission at 2 Gigabits/s.

Specific Interest

Development of the wideband public network.

Spinoffs

Development of the telecommunications industry (peripherals, equipment) and services.

Basic Technologies Involved

- Single-mode optic fiber;
- Source, multiplexers, detector;
- Switched-beam microwave-frequency antennas;
- Signal processing and switching;
- On-board systems architecture.

Working Schedule Contemplated

- Research and development of 2-Gigabit/s fiber-optics transmission systems:
    - optimization of high-throughput optic link techniques;
    - definition and development of optoelectronic components;
    - optimization of fiber characteristics.

- Research and development of payloads for wideband (30 gHz) geostationary communication satellites.

Launching Procedure - Management

Creation of European consortia.

[B] Possible Partners in France

- Manufacturers

CGE, Lyons Cables, ESD, MATRA, SAT [Telecommunications Company], etc.

- Public Organizations

PTT, CNET, etc.

[C] Possible Partners in Europe

- Great-Britain: Plessey, etc.
- Italy: Italtel, etc.
- FRG: ANT [expansion unknown], Siemens, etc.

[D] Benefits Derived From European Cooperation

Cost and market sharing.

[IV] Eurobio

- Artificial seeds
- Control and regulation systems

Artificial Seeds

Production of artificial seeds that will look like and be used like present seeds, but will cause agricultural plants to produce not only a raw material but an industrial-processing tool as well, through the introduction of new catalytic functions into the plant, which will be used during the industrial technological processing of the plant matter.

Control and Regulation Systems

R&D programs on control and fine regulation techniques that could be used for the microadministration of drugs or therapeutic products by means of devices implanted on man, or for the servo-control of bioreactors.

Eureka
Theme: Eurobio
Project Sheet: Artificial Seeds

[A] Description

Nature

To create and multiply a somatic plant embryo obtained by cloning, coated with reserves and an artificial membrane, and which would look like an be used like present seeds, with improved qualities.

Specific Interest

- Improved selection;

- Creation of hybrid varieties freed from sexual reproduction;

- Transfer of genes modifying cultural qualities (resistance to stress, diseases and insects, etc.) and technological characteristics (protein content, enzymes useful during processing, etc.);

- Possible robotization of seed manufacturing, and also of certain parts of the downstream process.

Plant genetic engineering has made considerable progress during the past few months. It is now possible to introduce new genetic information in agricultural plants.

This artificial genetic alteration can improve the plant. But, above all, it becomes possible to introduce new catalytic functions into the plant, which will prove useful during the industrial technological processing of the plant matter.

This approach consists in causing the agricultural plant to produce not only a raw material, but also an industrial processing tool. It amounts to a redistribution of tasks between field and factory, and to a revaluation of the agricultural function.

The genes artificially introduced into the plant can also be relied on to synthesize molecules that will serve to preserve the food after its technological processing. The use of chemical preservation methods could thus be reduced so as to better respect consumers' needs.

Spinoffs

- Economic: giving European companies leading positions on the world seed market (potentially worth $10 to 12 million);

- Organizational and social: changing the task and added-value distribution of the agrifood business, restructuring and revaluation of the agricultural

profession at European level: transfer between industry and agriculture. Qualification.

In addition, regulations concerning the use of enzymes and micro-organisms in agrifood substances keep increasing, and the demand offered could solve toxicity problems by introducing the technological-processing catalytic function into the plant from the start.

Basic Technologies Concerned

- Genetic engineering applied to plants;
- Enzymatic engineering;
- Plant physiology;
- Embryo culture;
- Packaging;
- Biodegradable materials;
- Coating techniques;
- Soft dehydration technique;
- Final film-coating technique;
- Development of bioreactors.

Working Schedule Contemplated

- Associating a few large laboratories and a few large companies to work on the scientific and agronomic aspect. A few small or medium-size companies (biotechnologies, fermentators, etc.) could also participate.

- Acquiring knowhow on one or two varieties. Industrial implementation would then be allocated among the participants.

[B] Possible Partners in France

- Manufacturers

Clause, Claeys-Luck, Elf-Aquitaine, Limagrain, Rhone-Poulenc, SANOFI [Aquitaine Financial Corp for Hygiene and Health], etc.

- Public Organizations

CNRS, INRA [National Institute for Agronomical Research], universities (Compiegne Technical University, INSA [National Institute for Applied Sciences], university laboratories), etc.

[C] Possible Partners in Europe

- Belgium: Plant Genetic System, SES [expansion unknown], Ghent University, etc.
- Denmark: The Danish Sugar Factory, etc.
- Great-Britain: AFRC [expansion unknown], Agricultural Genetics Company, Shell Nikkerson, etc.
- Netherlands: Royal Sluis, etc.

- FRG: Hoechst, Max Planck Institute for Breeding Research (Cologne), KWS [expansion unknown].
- Switzerland: Ciba-Geigy, Sandoz.

[D] Benefits Derived From European Cooperation

The capacities of European teams are at least equal to those of North-American or Japanese teams, but they do not have the latter's cohesion, a decisive factor of success.

European cooperation is a must if we are to emerge at industrial level within a period of time comparable to those of our U.S. and Japanese competitors.

Eureka
Theme: Eurobio
Project Sheet: Control and Regulation System

[A] Description

Nature

R&D programs on problems of control and fine regulation for use in the microadministration of drugs or therapeutic products by means of devices implanted on man, or for the servo-control of bioreactors.

Specific Interest

Recent progress in the miniaturization of regulation electronics and in the knowledge of ultra-fine biological parameters (hormonal dosages), as well as the need for bio-industries to control multiple reaction parameters (fermentator operation) using sensors and sophisticated regulation systems, lead to the recommendation that an interdisciplinary program should be set up, under which experts in electronics and servo-controlled equipment (and miniaturized equipment in the case of biomedical engineering) would work together with experts in pharmaceutics, pharmacology and clinics.

Spinoffs

- New systems to admininister drugs, in particular those requiring regulated admission depending on biological parameters.

Example: implanted pump system whose flow-rate is regulated continuously by physiological probes (insuline-diabetes, hormones-growth, etc.).

- New servo-control systems for biological reactors, continuously optimizing the bio-reactional environment so as to obtain the best yields in continuous operation.

There are a huge number of potential spinoffs in the health field: answering certain diseases or insufficiencies in a non-constraining manner, etc. as well as in the health-economics field: lower doses of therapeutic products, possibility of "decentralized" health care, etc.

There are also spinoffs in the bio-industries.

Basic Technologies Involved

- Biological and medical engineering;
- Electronics;
- Bioreactors.

Working Schedule Contemplated

- Expanding a project now under consideration with Siemens, concerning the microadministration of drugs by implanted devices;
- Research on sensors;
- Research on pumps and pump servo-control

[B] Possible Partners in France

Elf-Aquitaine, pharmaceutical groups, perfusion-pump manufacturers, etc.

[C] Possible Partners in Europe

Behring, Siemens, pharmaceutical companies.

[V] Euromat

Advanced-design industrial turbine

Development of structural materials through the construction of a high-efficiency industrial turbine.

Eureka
Theme: Euromat
Project Sheet: Advanced-Design Industrial Turbine

[A] Description

Nature

Turbine for land thermal engines of 500-1000 hp, high reliability and energy-efficiency exceeding 45 percent (industrial turbine).

Specific Interest

Increasing competence in the development and use of new materials in a single dynamic system (assembling and bonding different materials), of the "thermal engine" type.

Spinoffs

Enabling Europe to catch up in the field of ceramics.

Multiple sectors: space program, shuttle, automobiles, turbomachines, aeronautics. etc. Land and mobile-land applications.

Basic Technologies Involved

- Ceramics-to-metal bonds;
- Ceramic-ceramic composites;
- Resistance in corrosive atmospheres;
- Sintering of complex parts.

Working Schedule Contemplated (4-5 years)

1. Setting up the European project: identification of the partners and their contributions.
2. Designing the turbine and its components;
3. Drawing.
4. Research on materials: finding the optimum material for each component. Implementation of these materials.
5. Fabrication and partial testing of components (temperature exhangers, turbine, etc.).
6. Development of a demonstration model.

[B] Possible Partners in France

- Manufacturers (engine manufacturers and materials producers)

Alsthom, Ceraver, Hispano-Suiza, Rhone-Poulenc, SEP [European Propulsion Company], Turbomeca, Aubert & Duval, Imphy, SNECMA [National Aircraft-Engine Study and Manufacturing Conmpany], Framatome, Pechiney, Aerospatiale, etc.

- Public Organizations

ONERA, CNRS, etc.

[C] Possible Partners in Europe

- Great-Britain, AME [expansion unknown], British Ceramic Association, Harwell, Lucas, Rolls-Royce, etc.;
- Italy: Alfa-Romeo, Fiat, etc.
- FRG: BBC [Brown-Boveri Company], KHD [expansion unknown], KWU [expansion unknown], MTU [expansion unknown], Rosenthal, Technik, etc.

[D] Benefits Derived From European Cooperation

Enabling manufacturers to make a considerable and relatively long-term investment to constitute a common scientific and technical base.

CESTA
Center for Studies on Advanced Systems and Technologies
1, rue Descartes, 75005 Paris
Telephone: (1) 634.33.78
Telex: CESTA 250 795 F
Telefax: (1) 634.36.81

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CSO: 8119/0279

VARIOUS EUROPEAN AGENCIES, FIRMS ANNOUNCE EUREKA PROPOSALS

France's CEA To Participate

Paris ELECTRONIQUE ACTUALITES in French 17 Oct 85 p 2

[Article signed R.V.: "At a Symposium Organized for its 40th Anniversary, the CEA Stressed Its Determination to Be Represented in Eureka, in Space and in the Ocean"]

> [Excerpt] Some 250 people, including CGE [General Electricity Company], Thomson, Jeumont-Schneider, TRT [Radioelectric and Telephone Telecommunications] and Intertechnique executives, took part in a symposium organized on 14 October by the CEA [Atomic Energy Commission] to celebrate its 40th anniversary.

Certainly, as Mr Renon, CEA general director, pointed out, the nuclear sector will remain the "backbone" of CEA operations in years to come. But the CEA also intends to continue its research in non nuclear fields, especially in micro electronics. This symposium also gave the CEA an opportunity to stress its determination to be represented in space and ocean research: "We are ready to participate in the conquest of space and that of the oceans," Mr Renon stated in the presence of Mr Curien, minister of Research and Technology.

The CEA also wishes to participate in the European Eureka technological cooperation program and it has already proposed various projects: as Mr Curien observed, the CEA can decidedly play "a very important part in Eureka."

To Mr Renon, who also stressed the CEA's determination to continue its major basic research effort, Mr Curien answered: "You shall have the means to do so..."

The symposium of 14 October also gave the CEA an opportunity to stress its determination to "develop its pool of knowledge," especially in electronics, data processing and robotics, and to be "a privileged meeting place for researchers and manufacturers, a place where many technology transfers could develop."

In this respect, we should also note that, precisely to make such technology transfers easier, the CEA, for instance, just created a robotics and CIM [computer-integrated manufacturing] office, a light horizontal structure to coordinate the activities of the CEA's various directorates and subsidiaries in this field, which intends to "speak with one voice" to the CEA's partners and in particular, of course, to manufacturers. This office, the CEA indicated will "provide a connection between the various scientific and industrial entities to preserve their own dynamisms and help promote their activities as a whole."

CERN Offers Superconductivity, Cryogenics

Paris AFP SCIENCES in French 17 Oct 85 p 17

[Article: "The CERN Unveils Its Proposals for the Eureka Project"]

[Excerpt] Geneva--On 14 October in Geneva, Mr Herwig Schopper, general director of the CERN [European Nuclear Research Center], the European laboratory for particle research, unveiled the CERN's collaboration proposals to the European Eureka technological research project.

Mr Schopper pointed out that this collaboration was strictly for "civil" purposes, which might materialize in two of the laboratory's special fields: superconductivity technology, its corollary, cryogenics (methods to conserve electric current energy and to cool cavities to make this economy of energy possible when magnetic fields are created), and data-processing networks.

Aeronautics, Aerospace Firms Link Up

Paris AFP SCIENCES in French 17 Oct 85 pp 17-18

[Article: "Eureka: Cooperation Agreement Between the Five Leading Eruopean Aeronautics Companies"]

[Text] Paris-- The five leading European aeronautics and space companies--Aerospatiale (France), Aeritalia (Italy), British-Aerospace (Great-Britain), CASA [Aeronautics Engineering Company] (Spain) and Messerschmitt-Boelkow-Blohm (FRG) have signed a cooperation agreement as part of the European Eureka program, Aerospatiale announced on 16 October.

The communique indicated that the five European partners have agreed to "define possible projects according to principles defined by their respective governments in the aeronautics and space sectors."

These aeronautics firms have already cooperated in the past, in particular for the supersonic Concord, the Airbus, the ATR commuter aircraft, the Tornado fighter, the Ariane launcher and satellites TDF1-TV Sat).

The aeronautics manufacturers will furthermore define the domains in which their cooperation will be implemented, e.g. electronics, computer-aided design and manufacturing, the development of large data processing programs, robotics, lasers and fiber optics.

This agreement among manufacturers, signed on 15 October, the communique added, will also make it possible to include other companies, should the partners so decide, either as new partners in the general agreement or as associates in specific projects...

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CSO: 3698/108

MAX PLANCK INSTITUTE AGAINST PARTICIPATING IN SDI, FOR EUREKA

Frankfurt/Main FRANKFURTER ALLGEMEINE ZEITUNG in German 4 Dec 85 p 1

["Max Planck Society Against Secret Research"--AP headline]

[Text] The Max Planck Institute has raised considerable reservations against its participation in the American research involved in the SDI missile defense system under present conditions. The president of the private research society, Heinz Staab, recently stated in Bonn that the necessary prerequisites for the work of the Max Planck Institute is the "free information exchange" with scientists from all over the world. Secret research in these institutions is said to be "unimaginable." Thus far, the Max Planck Institute has not been asked by any side to participate in SDI.

The president welcomed the Eureka concept of the European Technological Community, which in the meantime has been expanded, which permits freedom of basic research and does not represent a European competition model for SDI. Another viewpoint is said to be that this concept augments the "one-way street" of researchers and research results from Europe to the United States by cross-connecting European science. It would naturally have been better had the program been based on existing scientific contacts and not "imposed from above."

Staab reiterated the objections against German participation in a manned space station which had been jointly formulated by the German Research Community and the West German Conference of University Rectors. In view of limited financial means for research, particularly stringent yardsticks have to be applied to possible scientific results. The limits of "science on the grand scale" lie where the breadth and multiplicity of basic research is overpowered.

5911
CSO: 3698/173

TASS: TIMING OF U.S. MISSILE DEPLOYMENT 'NOTEWORTHY'

LD121639 Moscow TASS in English 1615 GMT 12 Dec 85

[Text] Moscow, December 12 TASS--TASS news analyst Vladimir Matyash writes:

In disregard for the interests of European and international security, the United States goes on with rapid deployment of first strike nuclear missile weapons in Western Europe.

Allen Holmes, U.S. assistant secretary of state for politico-military affairs, has reported, speaking in the Belgian capital, that 140 launchers for "Pershing-2" and cruise missiles armed with nuclear warheads are to be stationed on the European Continent by early next year. The United States intends to deploy a total of 572 medium-range missiles by 1988. According to the latest official report by NATO officials, a total of 134 missiles have already been in place by now in the Federal Republic of Germany, Britain, Italy and Belgium. So, as early as in the next few weeks, the Pentagon and NATO will deploy in European territory almost a half of nuclear systems planned by the decisions of the North Atlantic bloc.

Noteworthy is the time chosen for these actions of the United States and the most aggressive NATO quarters, which are perilous to the cuase of peace. Only three weeks have passed since the general secretary of the CPSU Central Committee and the U.S. President met in Geneva and recorded in the joint statement on the results of this meeting the readiness and intention of both sides to work for removing the nuclear war threat and prevent a military edge of the Soviet Union and the United States over each other. They confirmed the need to work for enhancing strategic stability and reducing nuclear armaments. All this, apparently, goes against the grain of the advocates of the so-called "tough" course towards the Soviet Union and of the ongoing arms race.

This line for the sabotage of what has been reached in Geneva is in conflict with the interests of both the American people and the European peoples. It is perfectly obvious that by embarking on the course of attaining military superiority over the USSR, the U.S. Administration speeds up the stationing in Western Europe of U.S. first strike missiles. A situation emerges, which is fraught with a high level of military-political uncertainty and the risk attending it.

It is understandable that the nuclear arms race is a cause of particular concern for the European nations. People in the Soviet Union share this worry, since Europe is oversaturated with nuclear systems. The Soviet Union stands for freeing Europe completely of nuclear weapons, both medium range and tactical. The United States and its NATO partners, however, do not agree to this.

Proceeding from the interests of peace and enhanced international security, the Soviet Union has proposed, given a total ban on strike weapons, to halve all nuclear systems in possession of the USSR and the United States capable of reaching each other's territory and to limit the sum total of warheads on them to 6,000 units each. These are drastic reductions measured in thousands of nuclear warheads.

The Soviet Union demonstrated in deed to the whole world to see its wish and readiness to follow the path of formulating meaningful accords aimed at limiting and reducing nuclear armaments. The anti-war movement, which is gaining momentum in Europe, is fresh evidence that the Soviet proposals meet the European peoples' aspirations for lessening the nuclear threat and enhancing European security.

/12858
CSO: 5200/1195

SOVIET ARMY PAPER ON CONTINUED U.S. PRESSURE ON NETHERLANDS

PM111131 Moscow KRASNAYA ZVEZDA in Russian 11 Dec 85 Second Edition p 3

[TASS report: "The Pressure Continues"]

[Text] The Hague, 10 Dec -- The United States and the NATO bosses continue to bring powerful pressure to bear on the Netherlands in an attempt to secure the rescindment of its decision to refuse to fulfill some of the NATO tasks incumbent upon it in the sphere of the use of tactical nuclear weapons. This has once again been confirmed in the speech of U.S. General B. Rogers, supreme allied commander, NATO Forces, Europe, at a meeting of the Atlantic Committee -- a private pro-NATO organization in the Netherlands.

Having expressed unconcealed satisfaction on account of the decision by R. Lubbers' center-right government of consent to the deployment of 48 U.S. cruise missiles on the Netherlands' territory, Rogers nevertheless insisted that this country continue to fulfill in full all the tasks incumbent upon it within the framework of NATO's military structure in case of the outbreak of a war. As is well-known, announcing on 1 November this year its consent to the deployment of first-strike missiles, in the face of powerful opposition from the opponents of this dangerous step, the Netherlands Government simultaneously announced its renunciation of some of its "nuclear tasks" within the NATO framework.

Sharply criticizing this decision of the Netherlands, General Rogers stated that, in the event of a nuclear war, NATO strategy envisages involving as many countries as possible in this war at a very early stage, and, in his opinion, the refusal to use aircraft with nuclear weapons on board would deprive the Netherlands of the opportunity of participating. At the same time the NATO supreme commander voiced the fear that such a step by the Netherlands could "create a dangerous precedent" for other members of NATO.

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CSO: 5200/1195

TASS NOTES 'HYPOCRISY' OF UK ARMS CONTROL POLICY

LD161623 Moscow TASS International Service in Russian 1600 GMT 14 Dec 85

[Report by TASS correspondent Victor Borodin]

[Text] London, 14 Dec (TASS) -- The peace-loving public of Great Britain today held a mass protest demonstration at the U.S. Air Force base at Greenham Common (County of Berkshire), where the very new U.S. first-strike nuclear cruise missiles have already been brought up to a state of combat readiness. The courageous women of the "peace camp" at Greenham Common and several thousands of their supporters who converged here from all over the country took part in it.

As participants at the demonstration stated, they have gathered at the arsenal of "cruise death" to express their angry protest against the military preparations being continued by the West and being foisted on Great Britain and other countries of West Europe by the U.S. Administration.

In these days when the 6th anniversary of the passing of the shameful decision to site U.S. cruise missiles by the NATO bosses is here the world has not become a safer place. On the contrary, the leaders of West European countries, having decided irresponsibly to site these nuclear systems on their territory have faciliated an escalation in the arms race and the further worsening of the international situation. This bears witness in particular to the cynical hypocrisy of the Tory government which speaks out in favor of establishing arms control but in deeds obligingly fulfils the military directions of the United States and NATO. All this serves the dangerous aim of deepening the gulf of mistrust between countries and peoples, relating to different political systems and to convince the peace-loving public of the inevitability of nuclear war and the possibility of gaining victory in it. The intensive preparations at the military base in Molesworth for the reception and siting of a new batch of U.S. cruise missiles serve the same purpose, the speakers stressed in their speeches.

Official London, an activist in the peace movement from the town of Newbury (L. Edwell) pointed out, is thus not only reconciling itself to the nuclear occupation of Great Britain by the U.S. military clique but it is also turning the country's territory ever more actively into a target for a retaliatory nuclear strike in the event of a war beginning through the fault of the U.S. or NATO strategists.

The military police arrested 12 participants at the demonstration. Judicial and police repressions by the authorities have more than once in the past too been unleashed on the participants of the broad antiwar movement and the residents of the Greenham Common Camp. On the orders of the Tory government they even tried to bulldoze the camp from the face of the earth. But it exists. And as its bold inhabitants declared today, the struggle at Greenham Common, and as a whole around the country, will not cease until such time as "official Washington and London come to their senses and remove the cruise missiles from the British Isles as millions and millions of people are demanding."

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INTERMEDIATE-RANGE NUCLEAR FORCES

BRIEFS

TASS ON TOMAHAWK MISSILE FAILURE--Washington, December 9 TASS--The first testing of a cruise missile "Tomahawk" in the zone of the east coast of the USA has been a failure. According to a spokesman for the Pentagon, the missile was launched from a submarine in the Gulf of Mexico, but because of a malfunction of the control system an order came from a surveillance plane to stop the flight and a parachuting system was activated. The missile fell near the city of Freeport in Florida state and was then delivered to the Eglin Air Force base. The testing held was one of the elements of the program for a re-equipment of the U.S. Navy, within whose framework it is planned to purchase nearly 4,000 cruise missiles "Tomahawk" for equipping 190 surface ships and submarines. [Text] [Moscow TASS in English 1334 GMT 9 Dec 85 LD] /12858

GORBACHEV ANNOUNCES SS-20 STRUCTURES 'DISMANTLED'--Moscow, December 12 TASS--General Secretary of the CPSU Central Committee, member of the Presidium of the USSR Supreme Soviet Mikhail Gorbachev, receiving chairman of France's National Assembly Louis Mermaz today, stated: The Soviet Union's readiness to do everything in its power for resolving the problems of disarmament is confirmed by weighty practical steps. Thus, it was announced during the visit to France that the Soviet Union, at its own initiative, had removed the SS-20 missiles, additionally deployed earlier on in the European zone, from standby alert, while stationary structures for the missiles would be dismantled in the following two months. The USSR has kept its promise--the dismantling has been completed. [Text] [Moscow TASS in English 1740 GMT 12 Dec 85 LD] /12858

BELGRADE: SOVIET SPOKESMAN ON SS-20'S--Brussels, December 11 (TANJUG)--The Soviet Union aims to reduce the number of its SS-20 medium-range missiles on European territory to 243, a Soviet Embassy spokesman in Brussels announced this evening. Speaking at a press conference prior to the NATO ministers session in Brussels tomorrow, he said he was unable to confirm whether the reduction had already been effected, but pointed out that it provided proof of the Soviet Union's readiness to reach an agreement on disarmament in general and in particular on the reduction of medium-range missiles in Europe. [Text] [Belgrade TANJUG in English 0158 GMT 12 Dec 85 LD] /12858

TASS ON PERSHING-2 DEPLOYMENT IN FRG--Bonn, December 13 TASS--The deployment of 108 American nuclear Pershing two missiles has been completed in the Federal Republic of Germany. DPA news agency has reported, quoting informed sources in the NATO Headquarters in Brussels. This means that all American nuclear missiles of this type, envisaged by the NATO decision on "rearmament", have been based in the country contrary to the will of its population. Treading in Washington's footsteps, the right-wing conservative government in West Germany allowed the transformation of the country's territory into a launch pad for first-strike nuclear missiles targeted on socialist states. [Text] [Moscow TASS in English 2240 GMT 14 Dec 85 LD] /12858

TASS ON U.S. PERSHING-2 TEST--Washington, December 16 TASS--The United States carried a test of a Pershing-2 medium-range missile. The UPI news agency reports that it was the first in a series of test launches designed to check the combat readiness of U.S. missile crews stationed in West Germany. The deployment of all 108 Pershing-2 nuclear missiles has already been completed there in compliance with the NATO decision of December 1979 which provides for the siting of 572 Pershing-2 and cruise missiles in Western Europe. These systems are first-strike weapons and their deployment is a move aimed at achieving strategic superiority over the Soviet Union. [Text] [Moscow TASS in English 1941 GMT 16 Dec 85 LD] /12858

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